and in some there have been as many as twenty-two different cases of this terrible disease. . . . From the tenements comes a stream of sick, helpless people to the hospitals and dispensaries, few of whom are able to afford the luxury of a private physician, and some houses are in such bad sanitary condition that few people can be seriously ill in them and get well. . . . The most terrible of all the features of tenement-house life in New York, however, is the indiscriminate herding of all kinds of people in close contact; the fact that, mingled with the drunken, the dissolute, the diseased, dwell the great mass of the respectable workingmen of the city with their families.

(To be continued.)

EARLY STRUGGLES WITH CONTAGION

By ELLEN LA MOTTE
Johns Hopkins Hospital

Old as the history of civilization is the history of the great diseases that have preyed upon mankind. The most ancient records, the works of the earliest historians, contain accounts of great plagues and pestilences which were subject to neither check nor bound, and which, once started, would sweep through whole communities or countries until the supply of victims was exhausted. These diseases were originated in and cultivated by a total lack of the commonest laws of hygiene; they were combated only by the religious rites and impotent methods of ignorance, and further increased and propagated by the commercial activity of nations.

Leprosy was rife. It is one of the oldest of known diseases, having existed in Egypt some three or four thousand years before Christ. During the Middle Ages the number of lazar houses in Europe alone is estimated at twenty thousand; the number of individual cases and of separated colonies must therefore have brought the aggregate up to enormous figures. It was a disease that attacked rich and poor alike, and was met with everywhere in the civilized world.

The plague, or, as we now call it, bubonic plague, was perhaps the most terrible of all these diseases. It has been known to history since the second century, A.D., and from the sixth to the seventeenth century prevailed throughout Europe in epidemics of varying intensity. London seemed particularly subject to it. On an average of every decade or so, though sometimes as often as every three or four years, and again at intervals of twenty or thirty, there would be outbreaks of more or less severity. The climax was reached, however, in the great plague of 1665, in which a hundred thousand people are supposed to have perished.

But probably the most virulent, as well as the most fatal, of all of these diseases was small-pox. It was known in China for several hundred years before Christ, and became widespread throughout Europe at the time of the Crusades. It was first brought to America by the Spanish conquerors in the sixteenth century. Leprosy could be controlled by segregation; the plague confined itself to epidemics, tremendous enough, some of them, but with periods of practical quiescence between the outbreaks, but small-pox was ever present in the community, as much a recognized factor as tuberculosis or pneumonia is in our day. At times it broke out into epidemics more or less severe, but it prevailed for the most part as an enormous, ever-present source of danger. A most conservative estimate placed the annual mortality in London as late as the period between the years 1760 and 1800 at from two to five thousand per million living. No one was safe. Its presence was as familiar in the King's household as in the humblest laborer's; all classes and conditions of men were impartially smitten and decimated by this terrible disease.

In the year 1716 there was living in London a woman famed as the cleverest and most beautiful of the day. She was Lady Mary Wortley Montagu, a duke's daughter, "a great figure in a great society," a woman of influence and enthusiasm. In common with the majority of people in those days, she also had been a victim to small-pox, which "had deprived her of very fine eyelashes," though this fact does not seem to have marred her beauty. Her husband, Mr. Wortley Montagu, being at this time appointed ambassador to Turkey, she decided to accompany him to the Porte, undertaking thereby a journey which no woman, and very few men, had ever before attempted. To travel across the continent of Europe, through countries unsettled by wars, infested by robbers, over roads difficult and dangerous, was an act unprecedented. The effect was naturally heightened by Lady Montagu's rank and position, and the interest in the undertaking was further increased and sustained by a series of letters which she wrote at various points along the route, and which excelled in wit and force even in those days when letter-writing was a fine art.

It is in one of these, written at Constantinople, April 1, 1717, that we first find mention of that custom of inoculation that was soon to become so inseparably associated with her name:

"I am going to tell you a thing that will make you wish yourself here. The small-pox, so fatal and so general amongst us, is here entirely harmless by the invention of engrafting, which is the term they give it. There is a set of old women who make it their business to perform the operation every autumn, in the month of September, when the great heat is abated. People send to one another to know if any of their family has a mind to have the small-pox; they make parties for this purpose, and when they are met (commonly fifteen or sixteen together), the old woman comes with a nutshell full of the matter of the best sort of small-pox and asks what veins you please to have opened. She immediately rips open that you offer to her with a large needle (which gives you no more pain than a common scratch), and puts into the vein as much matter as can lie upon the head of her needle, and after that binds up the little wound with a hollow bit of shell."

Lady Montagu then describes a custom of the Greeks, who have a vein opened in the forehead, one in the breast, and one in each arm, to mark the sign of the cross, but, as she naïvely concludes, "this has a very ill effect, all these wounds leaving little scars, and is not done by those who are not superstitious, who choose to have them in the legs, or that part of the arm that is concealed." She then further declares her intention of trying this experiment on her little son, and of bringing this "useful invention" into fashion upon her return to England.

Her estimate of her ability in this direction was not mistaken. Upon her return in 1718 her little daughter was inoculated, as was the child of a London physician, and the physician of the embassy inoculated in London under her patronage. An account of the "practices and advantages" of the custom was sent to persons in the British Court, and at this moment the Princess Anne was seized with a most opportune attack of small-pox. Experiments were hastily made on some condemned criminals, and by the consent of the King, George I., the new discovery was then successfully practised upon her.

We can imagine Lady Montagu's delight. Yet, notwithstanding these successes and the ardor with which she propagated her new faith, the practice gained popularity very slowly. We find Steele congratulating Lady Mary on the "godlike delight of saving many thousand British lives," yet as a matter of fact, for the first eight years after its introduction only eight hundred and forty-five persons had been inoculated.

By 1740 the custom had fallen into neglect or disuse. It was revived from time to time as fresh impetus was given by favorable reports of its practice, but for the most part, though of recognized value, was not to a great extent made use of. The reason for this was obvious. By inoculation small-pox was rendered milder and safer for the individual, but extensively spread throughout the community, since a person suffering from the milder, inoculated form was as great a source of danger as if he had contracted the disease by natural methods. Calculations based on periods of forty years each before and after its introduction show the mortality to be seventy-two to the thousand before and eighty-nine to the thousand after the custom came into use—a sufficient increase to make it of very doubtful benefit. In Spain it was prohibited entirely. In France it was encouraged till a violent outbreak of small-pox resulted, when its use was abolished by law. In Germany and Russia it was resorted to in desultory fashion, but towards the close of the century the consensus of opinion seemed to be strongly against its use.

For many generations a belief had obtained in rural England that a person having an attack of cow-pox, a disease frequent among cattle, was protected against other contagion of small-pox. So prevalent was this belief that we even find a farmer, Benjamin Jesty, inoculating his wife and two children with cow-pox virus in the year 1770, at a time when the usual small-pox inoculation was much discredited. These farmers' tales, or superstitions, as they were considered, came to the ears of Edward Jenner, born in 1749, and at this time a youth of seventeen or so, and apprenticed to a country physician for the purpose of studying medicine. A young woman came in to consult his master one day, and at the mention of small-pox exclaimed, "I cannot take that disease—I have had cow-pox."

This remark made a deep impression on Jenner's mind. Two years later, when he was about twenty, he went to London to study medicine under the great Hunter, and to him he repeated this and similar other incidents that showed the common belief of the country folk. In return, Hunter's famous "Do not think, but try; be patient, be accurate," was the reply which stimulated all the years of careful study which were to follow.

Jenner remained in London for two years, at the end of which time he returned to his native Gloucestershire to take up the life of a simple country physician, but at the same time never to lose sight of the problem that he was determined to solve. He was himself convinced of the value of this as early as 1780, and the medical societies to which he belonged voted him a bore for his constant introduction of his favorite topic. But at last, at the end of sixteen years of slow investigation, he was able to make the first practical demonstration of his wonderful discovery. In 1796 he took virus from the hand of a dairymaid affected with cow-pox and introduced it into the hand of a young boy, who a few weeks later was inoculated with small-pox virus and successfully resisted the disease. Similar experiments were later performed on a hundred children, all of whom resisted subsequent small-pox inoculations, and in 1798 the famous treatise appeared, entitled "An Inquiry into the Cause and Effects of the Variola Vaccinæ, a Disease discovered in some of the Western Counties of England and known by the Name of Cow-pox."

Jenner's report attracted widespread attention. Vaccination rapidly came into use, and with its success the usual disputes common in such cases as to the priority of its discovery, followed later by attempts to cast utter discredit upon its value. Notwithstanding these controversies, however, the credit of the discovery remained where it belonged, and Jenner found himself the most famous man of the day, obtaining a recognition and distinction which no physician, before or since, has ever received.

The practice of vaccination is now almost general throughout the civilized world. Of its actual value little need be said. Owing to the disappointment, however, which followed the high hopes at first entertained, that by its use permanent immunity was assured, and in addition the unfortunate development of certain diseases through the use of impure lymph, violent reactions in public sentiment have from time to time arisen. Even to-day, when statistics seem to prove that a decrease in small-pox is directly proportionate to the thoroughness with which vaccination is carried out, there still exists large communities in which the custom is prohibited either by law or popular prejudice, and we find the opinions of the "anti-vaccinationists" supported by those of many educated and intelligent men.

Despite, however, this hostile sentiment, which for a century has continued, though it fortunately has not grown in proportion to the favor with which vaccination has been received, the value of the discovery is placed beyond dispute by the opinion of the great majority of physicians and laity throughout the world. This, together with the recent protective discoveries of our own day, and aided by the results attained by segregation and by the natural growth of better sanitation and hygiene, is bringing us within sight of the day when those diseases which for centuries have held humanity in subjection shall themselves be brought into subjection and under control.

References

Baron's "Life of Jenner."
Lady Montagu's "Letters."
Russell's "The Wonderful Century."
Gentleman's Magazine, September, 1757.
Edinburgh *Review*, October, 1806. Dr. Willan on "Vaccination."
Osler's "Practice of Medicine."
Encyclopædias, British and American.
"London," by Walter Besant.